

**WHAT IS CLAIMED IS:**

1. A method for operating an automation system comprising the steps of:

(a) executing an application program in an automation device;

(b) selecting at least one of a plurality of data addresses to monitor during execution of said application program;

(c) selecting a code address corresponding to said at least one of a plurality of data addresses selected for monitoring;

(d) transmitting to the automation device, as part of a request message, the data addresses selected for monitoring and the corresponding code address;

(e) recording the content of the data addresses selected for monitoring when the corresponding code address is reached during execution of the application program; and

(f) transmitting, as part of a result message, the recorded content of the data addresses selected for monitoring.

2. The method according to claim 1, wherein said application program controls and/or monitors an external process.

3. The method according to claim 1, wherein said code address comprises an address of said application program in proximity to a segment

of the application program that influences the content of the data addresses selected for monitoring.

4. The method according to claim 1, wherein all memory areas existing in the automation device, including registers, can be referenced using said plurality of data addresses.

5. The method according to claim 1, wherein the data addresses selected for monitoring are recorded by the automation device when the corresponding code address is reached, if a trigger condition is met.

6. The method according to claim 1, wherein the request message comprises a header segment, an entry data set segment, and at least one of a plurality of watch point segments, each of said watch point segments containing at least one code address and one data address.

7. The method according to claim 1, wherein the result message has a header segment, an entry data set segment, and at least one of a plurality of watch point segments, each of said watch point segments containing at least one code address and one data address.

8. The method according to claim 1, wherein the data addresses selected for monitoring are recorded by the automation device, and during execution of the application program are transmitted to a programming device at predetermined events.

9. The method according to claim 8, wherein said predetermined events are after each cycle when cyclical application programs are used.

10. The method according to claim 8, wherein in cyclical application programs, the data addresses selected for monitoring are recorded by the automation device and transmitted to the programming device in sections over several cycles.

11. The method according to claim 1, wherein instructions required for monitoring can be masked in the application program.

12. The method according to claim 1, wherein a request job generated by the automation device is blocked upon receipt of the request message in the case of multiple execution of an instruction corresponding to a code defined in the request message.

13. The method according to claim 4, wherein the data addresses selected for monitoring are recorded by the automation device when the corresponding code address is reached, if a trigger condition is met.

14. The method according to claim 1, also comprising the steps of the sending an acknowledgement message and a job number from the automation device to a programming device acknowledging receipt of said request message.

15. The method according to claim 1, also comprising the steps of the sending a release message from a programming device to said automation device to end monitoring.

16. An automation system comprising:

5 an automation device;

sensors providing data to said automation device;

a programming device;

a communications program that enables said automation device and said programming device to communicate with one another; and

10 a computer readable medium for each of said automation device and said programming device, on which is stored computer program for operating and monitoring said automation system, said computer program of said programming device storing instructions which, when executed, will perform the steps of:

15 selecting at least one of a plurality of data addresses to monitor during execution of an application program used by said automation device;

selecting a code address corresponding to said at least one of a plurality of data addresses selected for monitoring; and

20 transmitting to the automation device, as part of a request message, the data addresses selected for monitoring and the corresponding code address;

and wherein said computer program of said automation device stores instructions which, when executed, will perform the steps of:

executing said application program in said automation device, particularly a program to control and/or monitor an external process;

5            recording content of the data addresses selected for monitoring when the corresponding code address is reached during execution of the application program; and

transmitting to the programming device, as part of a result message, the recorded content of the data addresses selected for monitoring.

10           17. The automation system according to claim 16, wherein said code address comprises an address of said application program in proximity to a segment of the application program that influences the content of the data addresses selected for monitoring.

15           18. The automation system according to claim 16, wherein all memory areas existing in the automation device, including registers, can be referenced using said plurality of data addresses.

19. The automation system according to claim 16, wherein the data addresses selected for monitoring are recorded by the automation device when the corresponding code address is reached, if a trigger condition is met.

20           20. The automation system according to claim 16, wherein the request message comprises a header segment, an entry data set segment, and at least

one of a plurality of watch point segments, each of said watch point segments containing at least one code address and one data address.

21. The automation system according to claim 16, wherein the result message has a header segment, an entry data set segment, and at least one of a plurality of watch point segments, each of said watch point segments  
5 containing at least one code address and one data address.

22. The automation system according to claim 16, wherein the data addresses selected for monitoring are recorded by the automation device, and during execution of the application program are transmitted to the  
10 programming device at predetermined events.

23. The automation system according to claim 22, wherein said predetermined events are after each cycle when cyclical application programs are used.

24. The automation system according to claim 22, wherein in cyclical  
15 application programs, the data addresses selected for monitoring are recorded by the automation device and transmitted to the programming device in sections over several cycles.

25. The automation system according to claim 16, wherein instructions required for monitoring can be masked in the application  
20 program.

26. The automation system according to claim 16, wherein a request job generated by the automation device is blocked upon receipt of the request message in the case of multiple execution of an instruction corresponding to a code defined in the request message.

5           27. The automation system according to claim 16, wherein the data addresses selected for monitoring are recorded by the automation device when the corresponding code address is reached, if a trigger condition is met.

28. The automation system according to claim 16, also comprising the steps of the sending an acknowledgement message and a job number from the  
10 automation device to the programming device acknowledging receipt of said request message.

29. The automation system according to claim 16, also comprising the steps of the sending a release message from a programming device to said automation device to end monitoring.

15           30. The automation system according to claim 16, also comprising means for displaying or outputting transmitted and recorded data.